

CLAIMS

What is claimed is:

1. A variable capacity rotary compressor, comprising:
 - a housing to define first and second compression chambers having different capacities therein;
 - a rotating shaft to be placed in the first and second compression chambers;
 - first and second eccentric cams mounted to the rotating shaft and placed in the first and second compression chambers, respectively;
 - first and second eccentric bushes rotatably fitted over the first and second eccentric cams, respectively;
 - a locking unit to make one of the first and second eccentric bushes be eccentric from the rotating shaft while making a remaining one of the first and second eccentric bushes be released from eccentricity from the rotating shaft, according to a rotating direction of the rotating shaft, the first and second eccentric bushes being eccentric in opposite directions; and
 - a restraining unit outwardly projected from the rotating shaft by a centrifugal force when the rotating shaft is rotated, to restrain the first and second eccentric bushes.
2. The rotary compressor according to claim 1, wherein the restraining unit comprises:
 - a restraining member to reciprocate in a radial direction of the rotating shaft to be outwardly projected from the rotating shaft by the centrifugal force when the rotating shaft is rotated;
 - a locking part provided at a predetermined position of the first and second eccentric bushes to be locked by the restraining member when the restraining member is outwardly projected from the rotating shaft; and
 - a return spring included in the rotating shaft to inwardly bias the restraining member in the radial direction toward a central axis of the rotating shaft when the rotating shaft is not rotated, releasing the eccentric bushes.
3. The rotary compressor according to claim 2, wherein the restraining unit further comprises:

a support pin mounted to the rotating shaft, to pass through the restraining member in a longitudinal direction of the restraining member, and to guide a reciprocating movement and to restrict a moving range of the restraining member, with the return spring being placed between an inner surface of the restraining member and an outer surface of the support pin which passes through the restraining member.

4. The rotary compressor according to claim 1, wherein the locking unit comprises:
a locking pin mounted to the rotating shaft, to project from the locking pin; and
locking parts provided at opposite positions of the eccentric bushes, respectively, to allow the locking pin to be locked by either of the locking parts to make one of the first and second eccentric bushes be eccentric from the rotating shaft while making the remaining one of the first and second eccentric bushes be released from eccentricity from the rotating shaft, according to the rotating direction of the rotating shaft.

5. The rotary compressor according to claim 4, wherein the restraining unit comprises:

a restraining member installed in the rotating shaft at a position opposite to the locking pin, to reciprocate in a radial direction of the rotating shaft and to outwardly project from the rotating shaft by the centrifugal force when the rotating shaft is rotated;

a support pin mounted to the rotating shaft, to pass through the restraining member in a longitudinal direction of the restraining member, and to guide a reciprocating movement and to restrict a moving range of the restraining member; and

a return spring placed between an inner surface of the restraining member through which the support pin passes, and an outer surface of the support pin to inwardly bias the restraining member toward a central axis of the rotating shaft when the rotating shaft is not rotated, releasing the eccentric bushes.

6. A variable capacity rotary compressor, comprising:

a housing to define first and second compression chambers having different capacities therein;

a rotating shaft to be placed in the first and second compression chambers;

first and second eccentric cams mounted to the rotating shaft placed in the first and second compression chambers, respectively;

first and second eccentric bushes rotatably fitted over the first and second eccentric cams, respectively;

a cylindrical connecting part to connect the first and second eccentric bushes to each other while making the first and second eccentric bushes be eccentrically positioned from the rotating shaft in opposite directions;

a locking unit to make one of the first and second eccentric bushes be eccentric from the rotating shaft while making a remaining one of the first and second eccentric bushes be released from eccentricity from the rotating shaft, according to a rotating direction of the rotating shaft, the first and second eccentric bushes being eccentric in opposite directions; and

a restraining unit outwardly projected from the rotating shaft by a centrifugal force when the rotating shaft is rotated, restraining the first and second eccentric bushes.

7. The rotary compressor according to claim 6, wherein the locking unit comprises:
a locking pin mounted to the rotating shaft, to project from the rotating shaft; and

a locking slot provided around the cylindrical connecting part, to engage with the locking pin which is rotated by a predetermined range within the locking slot, one of the first and second eccentric bushes being eccentric from the rotating shaft while a remaining one of the first and second eccentric bushes being released from eccentricity from the rotating shaft when the locking pin is in contact with one of first and second ends of the locking slot.

8. The rotary compressor according to claim 7, wherein the locking pin is mounted to the rotating shaft via a screw-type fastening.

9. The rotary compressor according to claim 7, wherein the restraining unit comprises:

a restraining member installed in the rotating shaft at a position opposite to the locking pin, to reciprocate in a radial direction of the rotating shaft and to outwardly project from the rotating shaft by the centrifugal force when the rotating shaft is rotated, the restraining member being locked by an end of the locking slot which is opposite to the locking pin; and

a return spring included in the rotating shaft, to inwardly bias the restraining member toward a central axis of the rotating shaft when the rotating shaft is not rotated, releasing the eccentric bushes.

10. The rotary compressor according to claim 9, wherein the restraining unit further comprises:

a support pin which is mounted to the rotating shaft, to pass through the restraining member in a longitudinal direction of the restraining member, and to guide a reciprocating movement and to restrict a moving range of the restraining member, with the return spring being placed between an inner surface of the restraining member and an outer surface of the support pin which passes through the restraining member.

11. The rotary compressor according to claim 10, further comprising:

a stepped stop part having a large diameter and provided at an end of the support pin; and

a stepped locking portion provided on an inner surface of the restraining member, wherein the return spring is supported at a first end thereof by the stepped stop part, and is supported at a second end thereof by the stepped locking portion.

12. The rotary compressor according to claim 9, wherein the restraining member has a stepped outer surface with an outer diameter increased in a direction from an inside to an outside of the rotating shaft, and a stepped part, having a same shape as the stepped outer surface of the restraining member and provided at a predetermined portion of the rotating shaft, to receive the restraining member therein while allowing the restraining member to be retractable.

13. The rotary compressor according to claim 6, further comprising:

an eccentric part having a same shape as the eccentric cams and provided on an outer surface of the rotating shaft, to allow the locking unit and the restraining unit to be mounted to the rotating shaft through the eccentric part.

14. The rotary compressor according to claim 6, further comprising:

upper and lower flanges to rotatably support the rotating shaft; and

a partition plate located in the housing to partition the first and second compression chambers into each other.

15. The rotary compressor according to claim 6, further comprising:

first and second rollers to rotatably fit over the first and second eccentric cams, respectively;

a first vane installed between an inlet port and an outlet port of the first compression chamber, to reciprocate in a radial direction while being in contact with an outer surface of the first roller;

a second vane installed between an inlet port and an outlet port of the second compression chamber, to reciprocate in a radial direction while being in contact with an outer surface of the second roller; and

first and second vane springs to bias the first and second vanes, respectively,

wherein the inlet and outlet ports of the first compression chamber are arranged on opposite sides of the first vane, and the inlet and outlet ports of the second compression chamber are arranged on opposite sides of the second vane.

16. The rotary compressor according to claim 6, wherein the first and second eccentric cams are mounted to an outer surface of the rotating shaft to be placed in the first and second compression chambers, respectively, while being eccentric from the rotating shaft in a same direction.

17. The rotary compressor according to claim 15, wherein the first and second rollers are rotatably fitted over the first and second eccentric bushes, respectively.

18. The rotary compressor according to claim 13, wherein the eccentric part is mounted to an outer surface of the rotating shaft between the first and second eccentric cams to be eccentric from the rotating shaft in a same direction of the first and second eccentric cams.

19. The rotary compressor according to claim 6, further comprising:

a path control unit to control a refrigerant intake path to make a refrigerant fed from a refrigerant inlet pipe be drawn into an inlet port of the first compression chamber or an inlet port of the second compression chamber.

20. A variable capacity rotary compressor including a housing to define first and second compression chambers having different capacities therein, the compressor comprising:
a rotating shaft to be placed in the first and second compression chambers; and

a restraining unit outwardly projected from the rotating shaft by a centrifugal force when the rotating shaft is rotated to execute a compression operation, restraining eccentric bushes provided in the compressor to prevent the eccentric bushes from slipping.